



Goddard Procedural Requirements (GPR)

DIRECTIVE NO. GPR 1700.5
EFFECTIVE DATE: June 2, 2005
EXPIRATION DATE: June 2, 2010

APPROVED BY Signature: *Original Signed by*
NAME: Edward J. Weiler
TITLE: Director

COMPLIANCE IS MANDATORY

Responsible Office: Code 250 / Safety and Environmental (S&E) Division

Title: Control of Hazardous Energy (Lockout/Tagout)

PREFACE

P.1 PURPOSE

This directive identifies practice and procedure requirements designed to protect employees through Lockout/Tagout (LOTO) procedures. Specific definitions, practices, and procedures are outlined in Occupational Safety and Health Administration (OSHA) Standards under 29 C.F.R. 1910.147, "The Control of Hazardous Energy."

P.2 APPLICABILITY

This directive applies to all Government and contractor hazardous-energy control operations at the Goddard Space Flight Center (GSFC), including Greenbelt, Wallops Flight Facility, and remote locations under GSFC control. This directive applies to civil servant and contractor operations at these facilities. This directive applies to all hazardous-energy control operations (both industrial and construction) such as, but not limited to, electrical, mechanical, hydraulic, pneumatic, chemical, and thermal sources. For GSFC contractors, this directive is applicable through contract clauses in conformance with NASA FAR Procurement Supplements.

P.3 AUTHORITY

- a. 29 C.F.R Part 1910.147, The Control of Hazardous Energy (Lockout/Tagout), OSHA
- b. 29 C.F.R Part 1926.417, Locking and Tagging of Circuits

P.4 REFERENCES

None.

P.5 CANCELLATION

None.

P.6 SAFETY

Safety requirements are addressed in P.7 Training.

P.7 TRAINING

Designated personnel shall be required to attend a Lockout/Tagout Training Course and all associated on-the-job training (OJT). Initial and refresher training shall include the course content requirements as defined by 29 C.F.R 1910.147(c)(7). Managers and/or supervisors shall maintain documentation identifying current training records and requirements for each employee tasked to LOTO activities. This documentation shall be in writing.

P.8 RECORDS

Record Title	Record Custodian	Retention
LOTO Authorized Training and Associated OJT.	Office of Human Resources and Supervisors	<u>NRRS 3/33G1</u> . * Destroy 5 years after employee discontinues or completes training
Emergency Removal of LOTO Device	LOTO Manager/Supervisor	<u>NRRS 1/117.5</u> . * Handle as permanent pending retention approval.
Annual Review of the Control of Hazardous Energy Program.	LOTO Manager/Supervisor and Safety Office	<u>NRRS 1/125A</u> . * Destroy when 10 years old or when superseded or obsolete, whichever comes first.
LOTO Outage Log.	LOTO Manager/Supervisor	<u>NRRS 1/117.5</u> .

*NRRS - NASA Records Retention Schedules ([NPR 1441.1](#))

P.9 METRICS

- Annual/periodic review of Hazardous Energy Control Programmatic scores.
- Number of employees identified for LOTO training and completion rates.

P.10 DEFINITIONS

- Affected employee – An employee whose job requires him/her to operate or use a machine or equipment on which servicing or maintenance is being performed under lockout or tagout, or whose job requires him/her to work in an area in which such servicing or maintenance is being performed.
- Associated danger – The immediate area where hazards of processes may be encountered in a manner capable of causing injury or impairment in the function of any part of the body, usually by physical contact.
- Authorized employee – A person who locks out or tags out machines or equipment in order to perform servicing or maintenance on that machine or equipment. An affected employee becomes an

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authorized employee when that employee's duties include performing servicing or maintenance covered under this section.

- d. Capable of being locked out – An energy-isolating device is capable of being locked out if it has a hasp or other means of attachment to which or through which a lock can be affixed, or it has a locking mechanism built into it. Other energy-isolating devices are capable of being locked out if lockout can be achieved without the need to dismantle, rebuild, or replace the energy-isolating device or permanently alter its energy control capability.
- e. Energized – Connected to an energy source or containing residual or stored energy.
- f. Energy isolating device – A mechanical device that physically prevents the transmission or release of energy, including but not limited to the following: A manually operated electrical circuit breaker; a disconnect switch; a manually operated switch by which the conductors of a circuit can be disconnected from all ungrounded supply conductors, and, in addition, no pole can be operated independently; a line valve; a block; and any similar device used to block or isolate energy. Push buttons, selector switches, and other control circuit-type devices are not energy-isolating devices.
- g. Energy source – Any source of electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or other energy.
- h. Hot tap – A procedure used in the repair, maintenance and services activities that involves welding on a piece of equipment (pipelines, vessels, or tanks) under pressure, in order to install connections or appurtenances. It is commonly used to replace or add sections of pipeline without the interruption of service for air, gas, water, steam, and petrochemical distribution systems.
- i. Lockout – The placement of a lockout device on an energy-isolating device, in accordance with an established procedure, ensuring that the energy isolating device and the equipment being controlled cannot be operated until the lockout device is removed.
- j. Lockout device – A device that utilizes a positive means such as a lock, either key or combination-type, to hold an energy isolating device in a safe position and prevent the energizing of a machine or equipment. Included are blank flanges and bolted slip blinds.
- k. LOTO-Authorized Manager/Supervisor – An individual trained and qualified to identify existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.
- l. Normal production operations – The utilization of a machine or equipment to perform its intended production function.
- m. Servicing and/or maintenance – Workplace activities such as constructing, installing, setting up, adjusting, inspecting, modifying, and maintaining and/or servicing machines or equipment. These activities include lubrication, cleaning, or unjamming of machines or equipment, and making

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adjustments or tool changes, where the employee may be exposed to the unexpected energizing or startup of the equipment or release of hazardous energy.

- n. Setting up – Any work performed to prepare a machine or equipment to perform its normal production operation.
- o. Tagout – The placement of a tagout device on an energy isolating device, in accordance with an established procedure, to indicate that the energy isolating device and the equipment being controlled may not be operated until the tagout device is removed.
- p. Tagout device – A prominent warning device, such as a tag and a means of attachment, which can be fastened securely to an energy-isolating device in accordance with an established procedure, to indicate that the energy-isolating device and the equipment being controlled may not be operated until the tagout device is removed.
- q. Zero-Energy State – A condition that is reached when all energy sources to or within equipment are isolated, blocked, or otherwise relieved, with no possibility of reaccumulation. Equipment is not safe to work on until it is in a zero-energy state.

PROCEDURES

In this document, a requirement is identified by “shall,” a good practice by “should,” permission by “may” or “can,” expectation by “will,” and descriptive material by “is.”

1. ROLES AND RESPONSIBILITIES (CIVIL SERVICE AND CONTRACTOR)

1.1 Division Chiefs shall:

Ensure that Civil Service employees, onsite contractors, and construction contractors in their Divisions are informed of and adhere to the GSFC LOTO policy.

1.2 Safety and Environmental Division (S&E) shall:

- a. Administer, maintain, and revise the LOTO requirements in this directive as needed;
- b. Evaluate/approve specific written procedures for (1) equipment that cannot be locked out; or (2) situations when a secondary means of isolation is not possible or deemed appropriate;
- c. Provide information and consultation as necessary to management and employees involved in LOTO operations;
- d. Review LOTO procedures for specific projects at the request of managers or supervisors;
- e. Review periodically this directive and the effectiveness of the LOTO program as outlined herein;
- f. Coordinate with the Career Development and Employee Worklife Office Career Development and Training Group (Code 114) to make training in LOTO standards available to civil service staff;
- g. Provide contract and specification review as requested by GSFC management;
- h. Function as the regulatory liaison with outside agencies as needed for LOTO issues;

- i. Verify compliance with standards set forth in the program by periodic inspection of LOTO operations; and
- j. Suspend work where unsafe conditions are present.

1.3 LOTO-Authorized Managers and Supervisors shall:

- a. Complete the GSFC LOTO Training Course;
- b. Ensure that identified LOTO-authorized employees complete the GSFC LOTO Training Course and initial OJT for all applicable LOTO procedures;
- c. Maintain records, including those identifying OJT of LOTO authorized employees;
- d. Upon the completion of training and authorization requirements, issue an authorization that stipulates the specific equipment or types of equipment on which the authorized employee may perform LOTO operations;
- e. Provide additional OJT as needed to ensure that employees are thoroughly familiar with new or changed equipment and/or procedures;
- f. Maintain control of emergency keys for LOTO locks/devices;
- g. Remove LOTO locks/devices in the event of an emergency;
- h. Prepare and make available written equipment-specific procedures;
- i. Maintain records of LOTO outages;
- j. Ensure an Energy Control Program and associated LOTO procedures are written and adhered to in accordance with the requirements defined in 29 C.F.R 1910.147; and
- k. Evaluate LOTO procedures at least annually to assure that hazardous energy control procedures are implemented properly and that the employees are familiar with their responsibilities.

1.4 LOTO-Authorized Employees shall:

- a. Complete the GSFC LOTO Training Course and initial OJT for all applicable LOTO procedures;
- b. Recognize the conditions of work requiring the utilization of LOTO procedures;
- c. Use the materials and procedures specified in their organizations' Energy Control Program and this directive to implement the LOTO program compliance requirements; and
- d. When tagging out the energy source, use a standard GSFC tag which will be provided by FMD.

1.5 All Affected Employees shall:

Be familiar with their organizations' LOTO Program and:

- a. The general reasons for LOTO procedures;
- b. How to recognize LOTO procedures when in use; and
- c. The importance of not tampering with or removing a lock and/or tag in use as a part of a LOTO procedure.

1.6 Contracting Officers shall:

Contracting officers are responsible for enforcing the contractual safety clauses and specifications for noncompliance if records of equivalent training cannot be produced or if LOTO procedures are found to be deficient with respect to this document.

1.7 Contracting Officer's Technical Representatives (COTRs) shall:

- a. Review Contractor Safety Plans to ensure that LOTO programs are compliant with the provisions of this directive; and
- b. If an instance of noncompliance is found, take appropriate corrective action to ensure NASA and Federal requirements are met.

1.8 Onsite and Construction Contractors shall, unless otherwise required:

- a. Submit as part of the contract-required Safety Plan a LOTO program that meets the provisions of this directive; and
- b. Make available upon request training and authorization records that meet the requirements of the training section in this document.

2. LOTO PROCEDURAL REQUIREMENTS

All LOTO-identified activities shall have written LOTO procedures for each LOTO activity. Typical activities requiring LOTO procedures include, but are not limited to:

- a. Repairing electrical circuits or equipment;
- b. Working on or near equipment with movable parts;
- c. Clearing blocked or jammed mechanisms; and
- d. Working on lines carrying hazardous materials/substances, materials/substances under pressure, or materials/substances involving dangerous temperatures.

Appendix A of 29 C.F.R 1910.147 provides a sample of a typical "minimum" LOTO procedure.

LOTO procedures shall include:

- a. Scope – A list of the applicable equipment and any limits to the scope of the program;
- b. Purpose – A statement that equipment shall be isolated from hazardous energy or materials/substances, and that the equipment shall be locked or tagged out before equipment servicing or maintenance is performed;
- c. Authorization – The names of authorized and affected employees, if any, on the tag;
- d. Preparation for lockout or tagout – A list of the isolating devices to be locked or tagged out; and
- e. The procedural steps for locking or tagging out the hazardous energy source; the sequence of the lockout or tagout event.

2.1 Exclusions

LOTO procedures do not apply to minor tool changes, adjustments or other minor servicing activities that take place during normal production operations if they are routine, repetitive, and integral (as defined by OSHA) to the use of the equipment for production, provided that the work is performed using alternative measures that provide effective protection.

Refer to the decision-making flowchart on page 11. Use the flowchart as a tool to guide actions taken during the assessment of a variety of potential LOTO situations.

2.2 Administrative Locking Procedures

Authorized employees shall:

- a. Make a careful distinction between LOTO and various other locking practices (collectively referred to as “Administrative Locking”);
- b. Perform administrative locking for many reasons, including equipment security, programmatic purposes, or general safety. Examples of administrative locking are:
 - (1) Locked fences around high-voltage transformers;
 - (2) Locks on overhead-crane disconnect switches;
 - (3) A locked door to a laboratory that contains hazardous equipment; and
 - (4) A water valve locked in the open position.
- c. Reserve the LOTO procedure for those instances in which a zero-energy state must be ensured to allow personnel to service, maintain, or modify equipment;
- d. Use administrative locking as the primary means of protection during a servicing, maintenance, or modification procedure, and not as a substitute for LOTO;
- e. Distinguish administrative locking from LOTO in both practice and purpose. A group rather than an individual may control an administrative lock. An administrative application must not use GSFC-designated LOTO locks or LOTO tags. The “Caution, Special Conditions” tag is an administrative locking tag that shall not be used as a LOTO tag; and
- f. GSFC uses a special LOTO tag which is to be used only for tagout situations. Administrative lockouts will be tagged with an “out-of-service” tag which will be issued by FMD.

2.3 Emergency Removal

The LOTO Manager or Supervisor may remove the energy-controlling device when the authorized employee who applied a LOTO device is not available to remove it. This emergency procedure shall be performed only under extreme circumstances. Documentation must be maintained by the LOTO Manager/Supervisor summarizing the circumstances and rationale in such an event.

2.4 Tagout Only Procedures

- a. The use of a “tagout only” procedure shall be permitted only if an energy-controlling source is incapable of being locked out. Any energy-isolating device capable of being locked out shall be locked out, without exception;

- b. Where possible, a secondary means of isolating the hazardous energy shall be used. Examples include removal of an isolating circuit element, blocking of a controlling switch, opening of an extra disconnect device, or removal of a valve handle. Secondary means of isolation shall be identified on the tag, and tags shall be affixed to both the primary energy-isolating device, and to the mechanism at the secondary point of isolation;
- c. An equipment-specific LOTO written procedure shall be used if it is determined that an energy-supplying source is incapable of being locked out and a second means of isolation is not possible. Approval of this procedure must be obtained from S&E prior to implementation; and
- d. The design and procurement of hazardous energy-producing equipment shall allow for the acceptance of a primary lockout device when new machinery or equipment is installed, repaired, renovated, or modified.

2.5 Equipment De-Energization (Outage)

All affected employees shall be notified prior to the de-energizing of equipment to be locked and/or tagged out. The person responsible for the outage will contact the Facility Operations Manager (FOM), who shall then notify the affected persons as to when and where the LOTO procedure will take place, and on what equipment.

2.6 Equipment-Specific Written Procedures

The use of an equipment-specific written procedure is mandatory if the equipment undergoing servicing, modification, or maintenance has more than one energy source and requires the operation of more than one device to isolate the hazardous energy, or has potential for stored, residual, or accumulated hazardous energy.

Participants including:	Shall:
The department, group, or authorized employee most familiar with the equipment	<ul style="list-style-type: none"> • Generate a written energy-control procedure. • Explain the specific application of each LOTO step clearly in the context of the specific equipment.
Any authorized employee who will perform LOTO on the equipment	<ul style="list-style-type: none"> • Use this procedure.
Supervisors	<ul style="list-style-type: none"> • Ensure that equipment requiring a written procedure is so identified and that the procedure is readily available to the employees authorized to perform LOTO on the equipment. • Label <u>clearly</u> any equipment with an equipment-specific written LOTO procedure.
Supervisors or employees responsible for the equipment	<ul style="list-style-type: none"> • Determine the appropriate format and content of the label, for example: CAUTION—An equipment-specific written procedure exists for the locking and tagging of this equipment. This equipment-specific written procedure may be obtained from _____.

2.7 Requirements for Shift and Personnel Changes

LOTO operations shall ensure the continuity of LOTO protection during shift or personnel changes if work is to be continued by an oncoming shift. An orderly transfer of LOTO devices and procedures between authorized employees or supervisors shall be maintained.

Requires that	Shall
Both shifts	• Be present.
The outgoing shift	• Remove its lock and tag, as applicable.
The oncoming shift	• Place its lock and tag on the group LOTO device, immediately.
An outgoing employee	• Remove his or her lock and tag, as applicable. • Inform the authorized oncoming employee of any potential hazards.

3. LOTO DEVICES

- Locks, tags, chains, wedges, key blocks, adapter pins, self-locking fasteners, or other hardware shall be provided by the responsible party for the purpose of isolating, securing or blocking of machines or equipment from hazardous energy sources;
- Both lockout devices and tagout devices shall be singularly identified, shall be the only devices used for controlling energy, shall not be used for other purposes and shall be durable, standardized, substantial, and identifiable; and
- Padlocks or other devices shall be identified as being used for LOTO. Each padlock shall be identified with the authorized employee's name and employer. Padlock labels or other means of identification, i.e., engraving, can be used for affixing the authorized employee's name and employer. Lockout devices shall be substantial enough to prevent removal without the use of excessive force or unusual techniques, such as with the use of bolt cutters or other metal-cutting tools.

3.1 Keys

- Each LOTO padlock shall have two keys, primary and emergency;
- The primary key shall remain in the possession of the authorized employee who applied the lock;
- The emergency key shall be kept in a secured area (e.g., a lock box) with access limited to the authorized employee's immediate manager and one level of management above the authorized employee's manager; and
- The use of a group of locks with a common key for equipment with multiple energy-isolation devices is preferable in the event of a single employer. If a group of locks is keyed alike for this purpose, use one key only for use by the authorized employee and keep a second key for emergency use.

3.2 Tags

- a. Tags shall not be used in lieu of a lock unless the energy-isolating device is not physically capable of being locked;
- b. Tagout and attachment devices shall be substantial enough to prevent inadvertent or accidental removal;
- c. Tagout and the device used to attach it shall be of a nonreusable type, attachable by hand, self-locking and nonreleasable with a minimum unlocking strength of 50 lbs. or less and equivalent to a one-piece, all-environment nylon cable tie. Use protective clear plastic sleeves for outdoor applications;
- d. The authorized employee who performs LOTO shall complete all applicable sections of the tag;
- e. Tags with a placement application date exceeding 1 year from original placement date shall be re-evaluated to determine the purpose/effectiveness of the safeguard; and
- f. Tagout devices shall warn against hazardous conditions if the machine or equipment is energized and shall include a legend such as the following: Do Not Start. Do Not Open. Do Not Close. Do Not Energize. Do Not Operate.

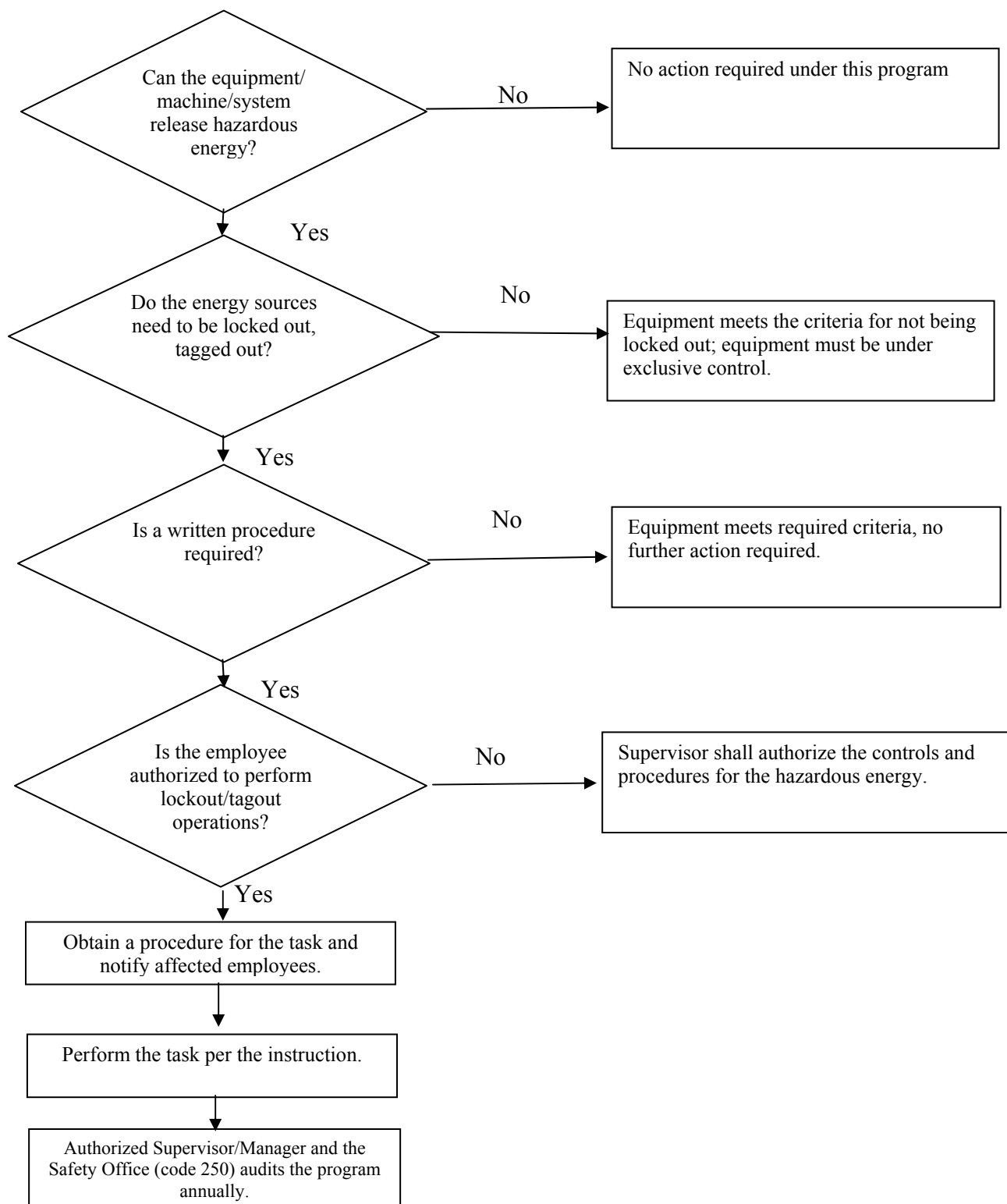
3.3 Other Hardware

LOTO procedures shall allow for managers to provide other hardware as required, such as multiple lock hasps and circuit breaker or valve lockout devices.

3.4 Record of LOTO Events

Documentation for each LOTO event is required to be recorded in an organizational/department or project log, or the equivalent. The following information shall be recorded:

- a. Name of authorized employee who performed the LOTO process;
- b. Date and time LOTO was applied;
- c. Equipment and/or circuit identification;
- d. Reason for LOTO application;
- e. Schematic drawing or print numbers, when available;
- f. Date and time of proposed LOTO removal; and
- g. Name of authorized employee who will remove LOTO if different from authorized employee who initiated the LOTO process.



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CHANGE HISTORY LOG

Revision	Effective Date	Description of Changes
Baseline	06/02/05	Initial Release

CHECK THE GSFC DIRECTIVES MANAGEMENT SYSTEM AT
<http://gdms.gsfc.nasa.gov> TO VERIFY THAT THIS IS THE CORRECT VERSION PRIOR TO USE.